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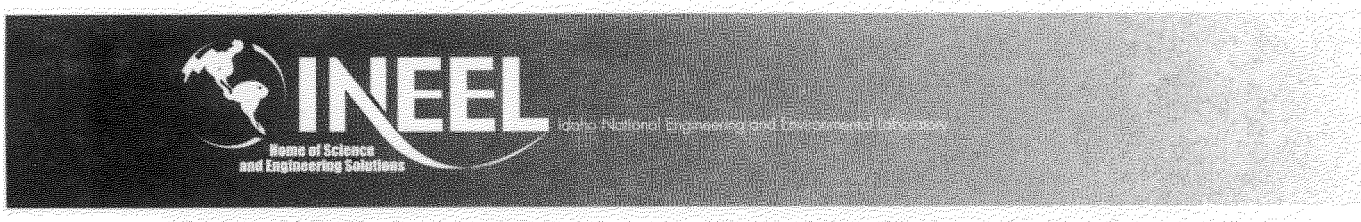
Idaho Operations Office

Sampling and Analysis Plan for SSSTF Waste Stabilization Operations, WAG 3, OU 3-13



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Sampling and Analysis Plan for SSSTF Waste Stabilization Operations, WAG 3, OU 3-13

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Prepared for the
U.S. Department of Energy
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ABSTRACT

This plan, along with the *Quality Assurance Project Plan for Waste Area Group 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE/ID-10587), comprises the Sampling and Analysis Plan for waste stabilization operations at the Staging, Storage, Sizing, and Treatment Facility (SSSTF), Waste Area Group 3, Operable Unit 3-13. The SSSTF is tasked with the handling and treatment of waste, primarily waste soil, prior to disposal in the INEEL CERCLA Disposal Facility (ICDF).

Two sampling and analysis tasks are described in this plan based on the SSSTF operational practices and data requirements for the stabilization of waste. Samples of treated waste from treatability studies will be collected and analyzed for regulated constituents to verify the stabilization mixture and process prior to waste delivery to the ICDF Complex. Sampling and analysis for regulated constituents of the stabilized wastes will also be conducted following full-scale treatment to confirm the results of the stabilization process. The objective of the sampling program is to ensure that all stabilized wastes meet, as applicable, "Treatment Standards" (40 CFR 268.40) or "Alternative LDR Treatment Standards for Contaminated Soils" (40 CFR 268.49) prior to disposal in the ICDF landfill.

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ACRONYMS

AA	alternative action
AOC	area of contamination
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
COC	chain of custody
CSCR	Cursory Subcontractual Compliance Review
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOT	Department of Transportation
DQO	data quality objective
DS	decision statement
EPA	Environmental Protection Agency
ERIS	Environmental Restoration Information System
ICDF	INEEL CERCLA Disposal Facility
ID	identification
IDW	investigation-derived waste
IEDMS	Integrated Environmental Data Management System
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
L&V	limitations and validation
LDR	land disposal restriction
MCP	management control procedure
OU	operable unit
PCB	polychlorinated biphenyl
PSQ	principal study question

QA	quality assurance
QA/QC	quality assurance/quality control
QAPjP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SMO	Sample Management Office
SOW	Scope of Work
SRPA	Snake River Plain Aquifer
SSSTF	Staging, Storage, Sizing, and Treatment Facility
SVOC	semivolatile organic compound
TCLP	toxicity characteristic leaching procedure
TSCA	Toxic Substances Control Act
UTS	Universal Treatment Standard
VOC	volatile organic compound
WAC	Waste Acceptance Criteria
WAG	waste area group
WMG	wide-mouth glass

Sampling and Analysis Plan for SSSTF Waste Stabilization Operations, WAG 3, OU 3-13

1. INTRODUCTION

The Department of Energy Idaho Operations Office (DOE-ID) authorized a remedial design/remedial action (RD/RA) for the Idaho Nuclear Technology and Engineering Center (INTEC) in accordance with the Waste Area Group (WAG) 3, Operable Unit (OU) 3-13 Record of Decision (ROD) (DOE-ID 1999).

The ROD requires Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remediation wastes generated within the Idaho National Engineering and Environmental Laboratory (INEEL) boundaries to be removed and disposed of on-Site in the INEEL CERCLA Disposal Facility (ICDF). The ICDF landfill, which will be located south of INTEC (Figure 1-1) and next to the existing percolation ponds, is an on-Site, engineered facility meeting the substantive Department of Energy (DOE) Order 435.1, Resource Conservation and Recovery Act (RCRA) Subtitle C, Idaho Hazardous Waste Management Act, Toxic Substances Control Act (TSCA), and polychlorinated biphenyl (PCB) landfill design and construction requirements. The ICDF will include the necessary subsystems and support facilities to provide a complete waste disposal system.

The major components of the ICDF Complex are the disposal cells, an evaporation pond, and the Staging, Storage, Sizing, and Treatment Facility (SSSTF). The disposal cells, including a buffer zone, covers approximately 40 acres, with a disposal capacity of about 510,000 yd^3 (389,900 m^3). The ICDF Complex is designed to provide centralized receiving, inspection, and treatment necessary to stage, store, and treat incoming waste from various INEEL CERCLA remediation sites prior to disposal in the ICDF, or shipment off-Site. All ICDF Complex activities shall take place within the WAG 3 area of contamination (AOC) to allow flexibility in managing the consolidation and remediation of wastes without triggering land disposal restrictions (LDRs) and other RCRA requirements, in accordance with the OU 3-13 ROD. Low-level, hazardous, and limited quantities of TSCA wastes will be treated and/or disposed of at the ICDF. Most of the waste will be contaminated soil, but debris and investigation-derived waste (IDW) will also be included in the waste inventory. ICDF leachate, decontamination water, and water from CERCLA well purging, sampling, and development activities will also be disposed of in the ICDF evaporation pond.

Only INEEL on-Site CERCLA wastes meeting the Agency-approved Waste Acceptance Criteria (WAC) will be accepted at the ICDF. An important objective of the WAC will be to ensure that hazardous substances disposed of in the ICDF will not exceed groundwater quality standards in the underlying groundwater aquifer. Acceptance criteria will include restrictions on contaminant concentrations based on groundwater modeling results with the goal of preventing potential future risk to the Snake River Plain Aquifer (SRPA).

1.1 ICDF Project Background

The major components of the ICDF Complex are the ICDF landfill disposal cells, an evaporation pond, and the SSSTF. Layout of the ICDF Complex is shown in Figures 1-2. Figure 1-3 shows more specifically the areas for the SSSTF.

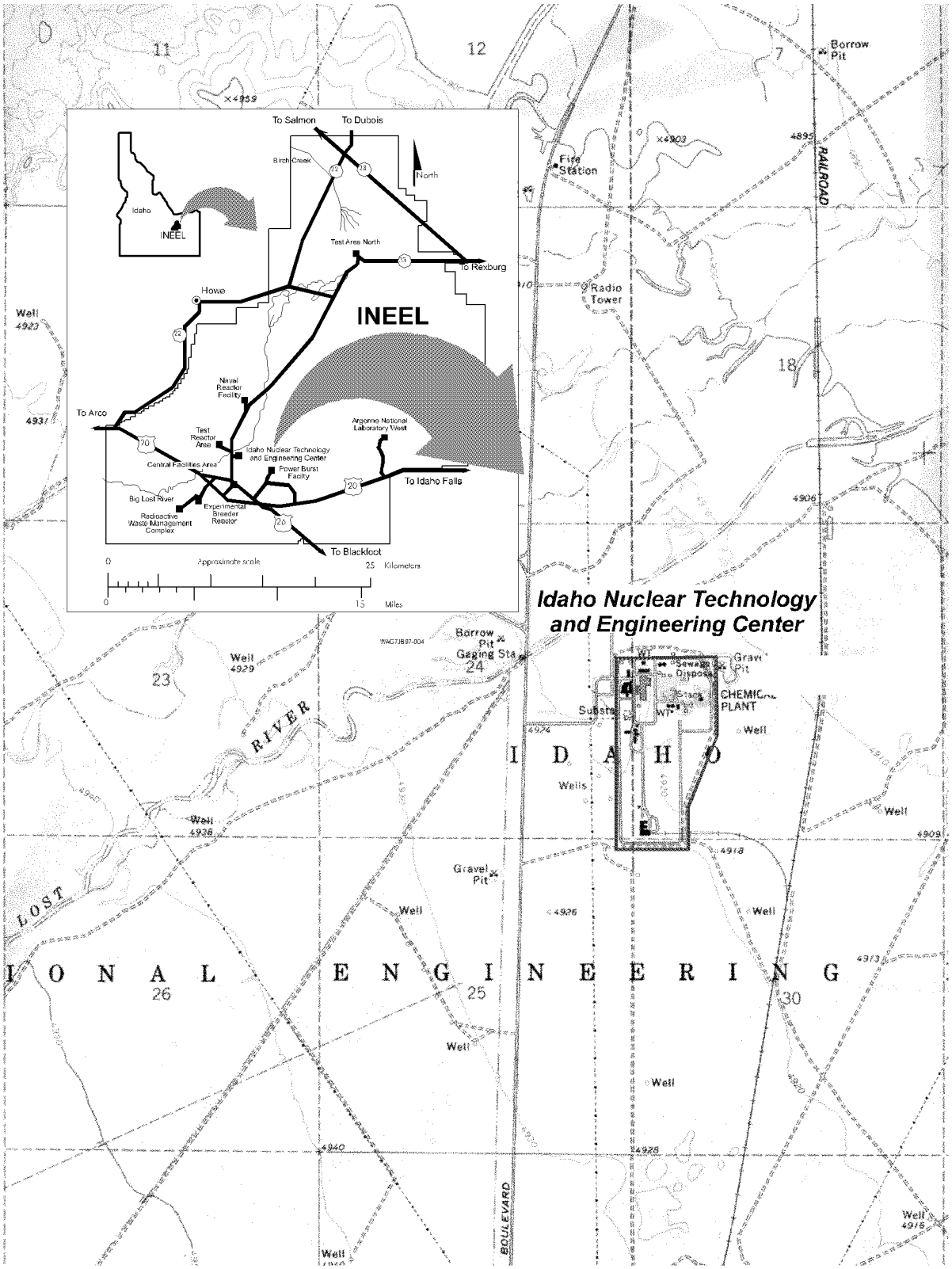

Figure 1-1. Location of INTEC within the INEEL.

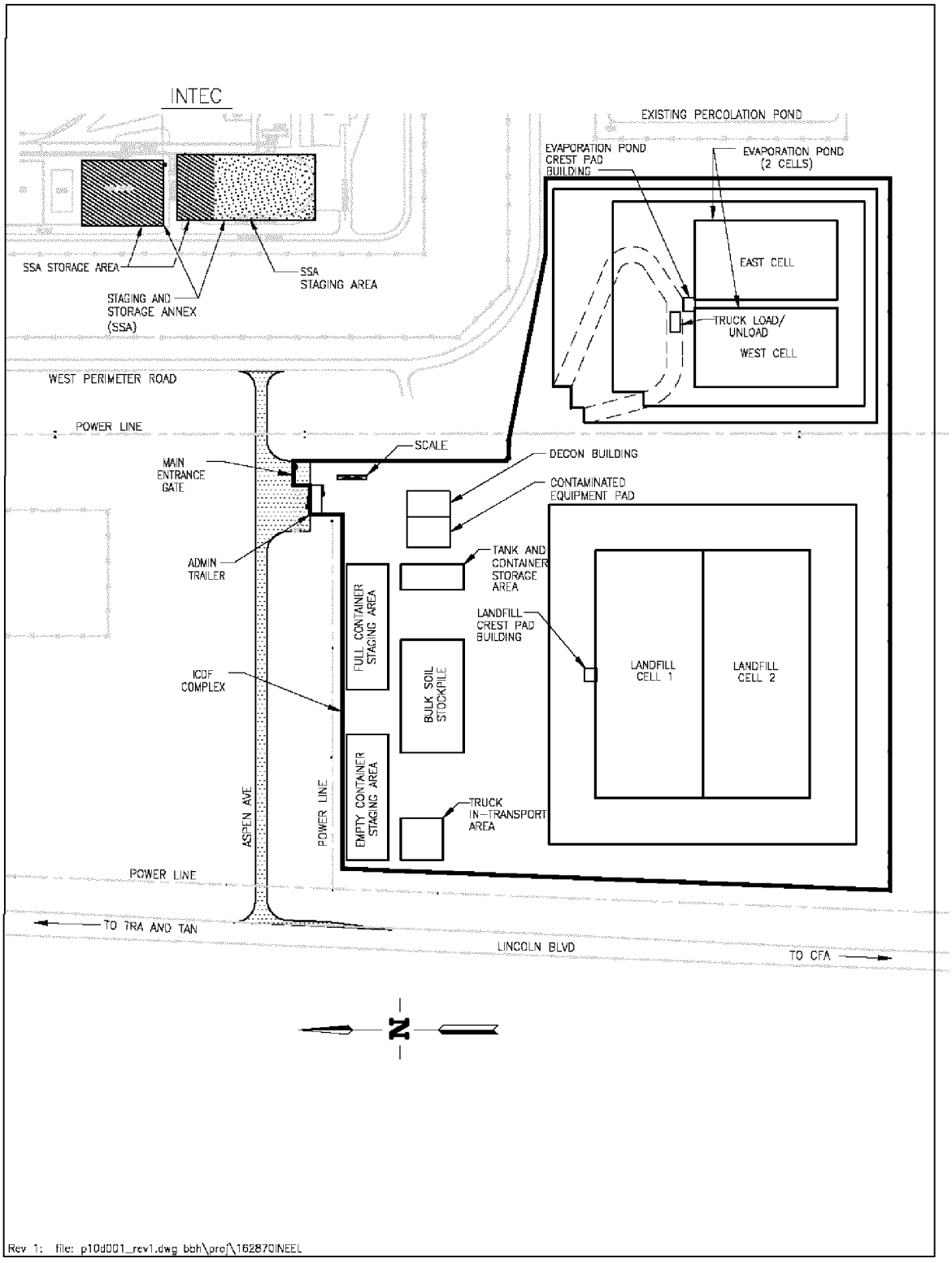

Figure 1-2. ICDF Complex layout.

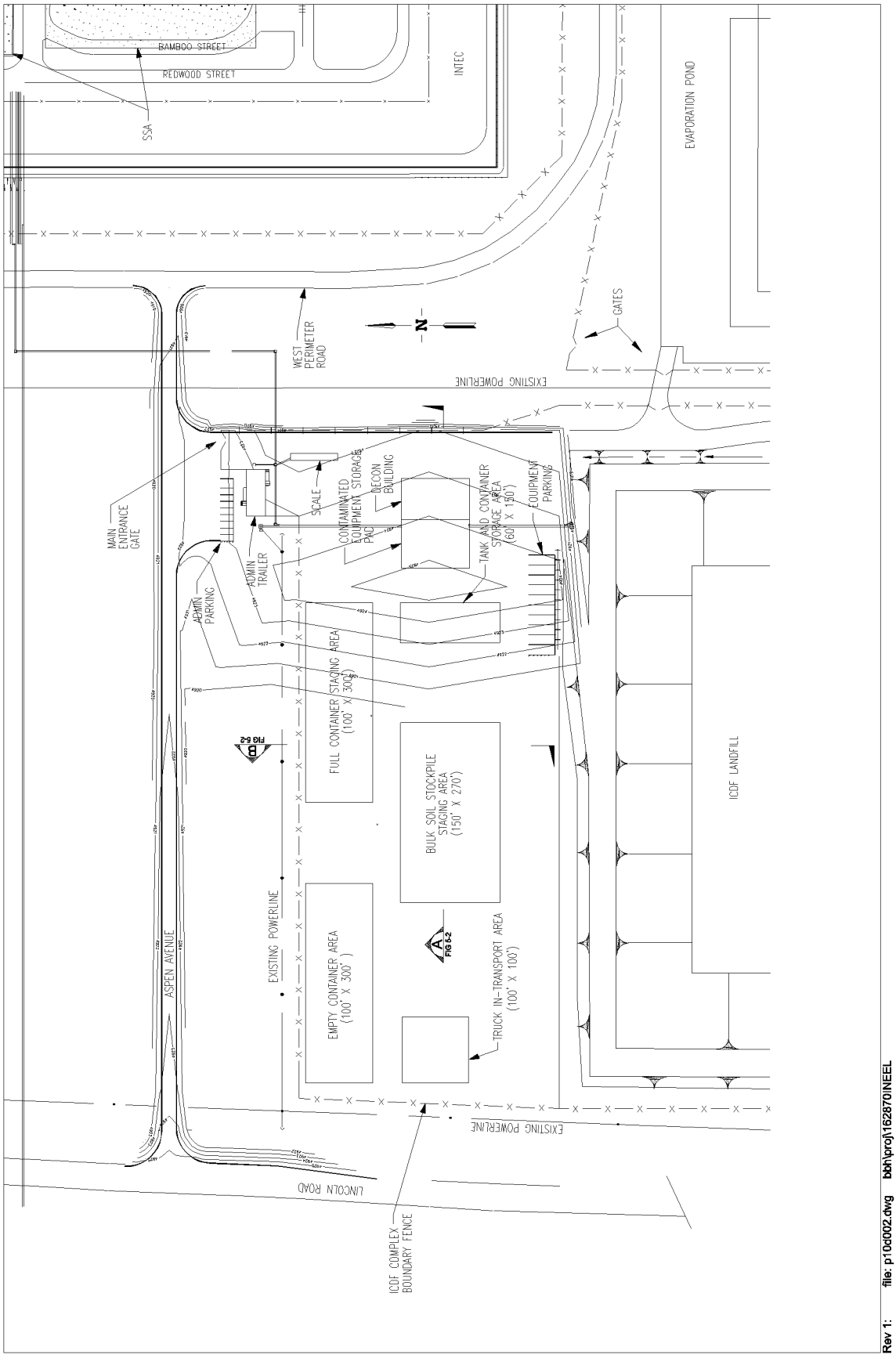

Figure 1-3. Detailed SSSTF layout.

The ICDF Complex systems to support the waste receipt and treatment include the following systems, structures, and components:

- Administration facility
- Decontamination facility (includes waste stabilization systems)
- Contaminated equipment storage pad
- Waste storage and staging areas
- Staging and Storage Annex
- General infrastructure (roads, utilities, fences).

The decontamination facility is located near the landfill entrance and will provide an equipment decontamination area and an area for waste to be treated, if necessary, prior to going to the landfill. Wastes requiring treatment prior to disposal will be delivered to the treatment room in the decontamination facility or placed in a staging area until the next treatment campaign. The waste will be transferred into a mixing system where the cement, water, and other reagents will be added and thoroughly mixed. After blending, the mix will be transferred into a waste container, sampled, and staged for disposal. Treated waste that meets the ICDF landfill WAC will be disposed in the landfill.

In addition to the direct treatment for stabilization of wastes, waste treatability studies will be performed as part of the ICDF Complex operations to validate the stabilization formula for wastes. Prior to shipment to the ICDF Complex, chemical characterization of the waste will be performed by the generator as required by standard operating procedures for the receipt and processing of waste at the ICDF Complex. The waste characterization and verification sampling and analysis will be used to demonstrate that the waste meets the appropriate ICDF Complex WAC. Additionally, waste characterization will also confirm whether treatment is required for the waste to meet LDRs prior to final disposal in the ICDF landfill. If the waste characterization indicates the need, treatability studies will be performed on waste. The generator will provide waste samples for the treatability studies. The treatability studies will be conducted to adjust waste loading on the predetermined chemical fixation and stabilization formulas to treat regulated waste consistituents to meet LDRs prior to waste acceptance and full-scale batch treatment of the waste.

A more complete discussion of the ICDF Complex operations and treatability studies are provided in the following documents:

- *Remedial Design/Construction Work Plan for the Waste Area Group 3 Staging, Storage, Sizing, and Treatment Facility* (DOE-ID 2002a)
- *ICDF Complex Operations and Maintenance Plan* (DOE-ID 2003a)
- *Waste Acceptance Criteria for ICDF Landfill* (DOE-ID 2002b).
- *ICDF Complex Waste Verification Sampling and Analysis Plan* (DOE-ID 2003b)
- *Treatability Study Test Plan for Soil Stabilization* (DOE-ID 2003c)

1.2 Objective and Scope

The objective of this Sampling and Analysis Plan (SAP) is to provide the method for the sample collection and analyses required of the ICDF Complex treatability studies and waste treatment operations for waste stabilization. Both operations (treatability studies and full-scale batch treatment) have the objective of producing treated wastes that meet the LDRs. In the case of the treatability studies, sampling and analysis will be performed following each iteration of treatment and waste loading formulas until an acceptable treatment formula is found. For the full-scale batch treatment operations, sampling will be performed on the treated wastes to confirm that the treatment was successful and that the treated waste can be disposed of in the ICDF landfill. In both cases, confirmation of the stabilization actions will be based on the treated waste meeting, as applicable, the treatment standards (40 CFR 268.40) or alternative LDR treatment standards for contaminated soils (40 CFR 268.49), as determined through standard Environmental Protection Agency (EPA) laboratory methods.

2. DATA QUALITY OBJECTIVES

To help with defensible decision-making, the EPA has developed the data quality objective (DQO) process, which is a systematic planning tool based on the scientific method for establishing criteria for data quality and for developing data collection designs (EPA 1994). DQOs have been developed to guide sampling of the ICDF Complex soils treatment process. The process consists of seven iterative steps that yield a set of principal study questions and decision statements that must be answered to address a primary problem statement. The seven steps comprising the DQO process are listed below:

Step 1: State the problem

Step 2: Identify the decision

Step 3: Identify the inputs to the decision

Step 4: Define the study boundaries

Step 5: Develop decision rules

Step 6: Specify limits on the decision

Step 7: Optimize the design for obtaining data.

The DQOs that govern the ICDF Complex soils waste stabilization sampling and analyses are presented in the following sections.

2.1 Problem Statement

This Sampling and Analysis Plan is intended to provide data to confirm the results of two separate but closely related operations: the ICDF Complex waste stabilization treatability studies and full-scale ICDF Complex waste stabilization operations. For the treatability studies, the problem is to verify the process or formula for stabilization of a waste sample such that the contaminants meet the LDR treatment standards. Compliance with LDR treatment standards may be achieved by meeting 40 CFR 268.40 treatment standards or 40 CFR 268.49 alternative treatment standards for contaminated soil, as applicable. For the full-scale treatment operations, the problem is to confirm the treated wastes meet the LDRs prior to disposal, again through following standard EPA analytical methods. Waste characterization information, will identify the regulated constituents that are considered potentially present and covered under the Universal Treatment Standard (UTS) 40 CFR 268.48.

2.2 Identify the Decisions

This step in the DQO process is used to identify the decisions and the potential actions that will be taken based on the data collected. This is done by specifying principal study questions (PSQs), alternative actions (AAs) that could result from resolution of the PSQs, and combining the PSQs and AAs into decision statements (DSs). Given that different decisions are required from the two separate operations (treatability studies versus full-scale operations), two separate PSQs and associated AAs and DSs are developed below.

The objective of the treatability studies activity is to answer the following PSQs:

PSQ1: Does the stabilization and waste loading formula yield a treated waste that meets the following alternative LDR treatment standards for contaminated soil (40 CFR 268.49)?

(A) For non-metals except carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90 percent reduction in total constituent concentrations, except as provided by paragraph (c)(1)(C) of this section.

(B) For metals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90 percent reduction in constituent concentrations as measured in leachate from the treated media (tested according to the toxicity characteristic leaching procedure [TCLP]) or 90 percent reduction in total constituent concentrations (when a metal removal treatment technology is used), except as provided by paragraph (c)(1)(C) of this section

(C) When treatment of any constituent subject to treatment to a 90 percent reduction standard would result in a concentration less than 10 times the Universal Treatment Standard for that constituent, treatment to achieve constituent concentrations less than 10 times the Universal Treatment Standard is not required. Universal Treatment Standards are identified in 40 CFR 268.48 Table UTS.

(D) The treated soil does not exhibit the hazardous characteristic of ignitability, corrosivity, or reactivity.

PSQ2: Does the stabilization and waste loading formula yield a treated waste that meets the LDR treatment standards (40 CFR 268.40)?

The AAs to be taken based on resolutions of the PSQs are

AA1: If the contaminants do not meet the above treatment standards, then the waste loading is decreased in accordance with the Treatability Study Test Plan.

Combining the PSQs and AA result in the following DS:

DS1: Determine whether the waste treatment formula effectively treats the waste sample for UTS constituents or if further testing is needed at the next lower waste loading in accordance with the Treatability Study Test Plan.

The objective of the full-scale operation sampling and analysis activity is to answer the following PSQ:

PSQ3: Does the stabilization process yield a treated waste that meets the alternative LDR treatment standards for contaminated soil or treatment standards for hazardous wastes?

The AAs to be taken based on resolutions of the PSQ are

AA2: If the treated waste does not meet the alternative LDR treatment standards for contaminated soil or the treatment standards for hazardous wastes, then the stabilized waste will be considered hazardous and alternative treatment/disposal will have to be determined.

Combining the PSQ and AA result in the following DS:

DS2: Determine whether or not the stabilized waste meets the ICDF WAC.

2.3 Decision Inputs

The purpose of this step is to identify informational inputs that will be required to resolve the DSs and determine which inputs require measurements. For both the treatability studies decision, DS1, and the full-scale operations decision, DS2, the information needed to resolve the DSs is the identification and quantification of applicable regulated constituents found in the stabilized waste from full-scale operations and stabilized samples from treatability studies. Concentrations of the regulated constituents of concern from the stabilized waste and treatability study samples will be obtained using standard EPA laboratory analytical methods conducted in accordance with the UTS.

During this step of the DQO process, the basis for an action level is also established. The action level is the threshold value that provides the criterion for choosing between AAs. Action levels may be based on regulatory thresholds or standards or they may be derived from problem-specific considerations such as risk analysis.

The driver for this SAP is to ensure that waste disposed in the ICDF landfills meets the ICDF WAC. Per the ICDF WAC, data collected during this activity will be used to determine constituents of concern that may be present at levels above the treatment standards as defined in 40 CFR 268.40 or the alternative LDR treatment standards for contaminated soil defined in 40 CFR 268.49. Therefore, for this effort there are constituent-specific numerical values for the action level. That is, for each constituent of concern, an action level is specified. If it is found that the waste possesses a hazardous characteristic, data concerning concentrations will be required in order to properly treat and/or dispose of the waste.

2.4 Study Boundaries

This step in the DQO process defines the spatial and temporal boundaries of the study covered by the DSs. Defining the spatial boundaries involves specification of characteristics that define the population of interest, define the physical extent of the study area, and may include subdividing the population of interest into specific areas (or strata) of interest. The temporal boundaries define the duration of the study or specific parts of the study. The appropriate outputs of this step are a detailed description of the spatial and temporal boundaries of the problem and a discussion of any practical constraints that may interfere with the study.

The spatial boundaries of concern for this study are confined to the individual treatability samples and the containerized materials representing full-scale treatment batches. A typical batch is approximately 2 yd^3, which is equal to the amount of soil in a 2- × 4- × 8-ft box. The data collected from the analysis of the treated material will be used to make independent decisions concerning treated waste in containers as delivered to the ICDF landfills for disposal. The data obtained from the individual treatability samples will be used to verify the stabilization formula. The characteristics that define the population of interest are the contaminant concentrations found in the representative samples of the containerized material and treatability samples.

2.5 Decision Rule

The objective of this step is to define the parameters of interest that characterize the population, specify the action level, and integrate previous DQO outputs into a single statement. This statement

defines the conditions that would cause the decision-maker to choose among AAs. The decision rule typically takes the form of an "If…then" statement describing the action to take if one or more conditions are met.

The decision for both treatability studies and full-scale operations will be based on whether contaminant concentrations exceed the treatment standards (40 CFR 268.40) or alternate LDR treatment standards for contaminated soil (40 CFR 268.49), as applicable.

Under the treatment standards requirement, 40 CFR 268.40, regulated hazardous constituents must be treated by a specific technology and/or to a treated constituent concentration (see Treatment Standards for Hazardous Wastes table in 40 CFR 268.40).

Under the applicable requirement, 40 CFR 268.49 (c)(1)(A-C), "Treatment Standards for Contaminated Soils," the following conditions must be met:

> (A) For non-metals except carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90 percent reduction in total constituent concentrations, except as provided by paragraph (c)(1)(C) of this section.
>
> (B) For metals and carbon disulfide, cyclohexanone, and methanol, treatment must achieve 90 percent reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP) or 90 percent reduction in total constituent concentrations (when a metal removal treatment technology is used), except as provided by paragraph (c)(1)(C) of this section.
>
> (C) When treatment of any constituent subject to treatment to a 90 percent reduction standard would result in a concentration less than 10 times the Universal Treatment Standard for that constituent, treatment to achieve constituent concentrations less than 10 times the Universal Treatment Standard is not required. Universal Treatment Standards are identified in 40 CFR 268.48 Table UTS.
>
> (D) Soils that exhibit the characteristic of ignitability, corrosivity, or reactivity must be treated to eliminate these characteristics.

Based on the above requirements and with a given waste stream or treatability study sample, compliance with the applicable LDR treatment standards must be demonstrated through sampling. An example in terms of thallium concentrations in soil would be as follows: With a UTS standard of 0.20 mg/L for thallium, if a thallium concentration of 1.9 mg/L was found in a waste sample, treatment would not be required and this SAP would not be implemented (assuming all other UTS constituents were also below 10 times the UTS). If a thallium concentration of 19 mg/L was found in the waste sample, treatment of the waste to less than 2.0 mg/L would be required. If a thallium concentration of 190 mg/L was discovered, treatment of the waste to less than 19 mg/L would be required.

The following decision rules are derived from the above requirements:

If the concentration in pretreatment soil sampling (provided by waste generator) for any constituent of concern indicates that the waste soil has constituent concentrations that are greater than the 100 times the constituent-specific maximum concentration of a contaminant for the UTS, *then* the treatment of the material represented by sampling of the treated waste or treatability samples will be determined when analysis of the treated waste demonstrates a 90% reduction in waste constituent concentrations.

If the concentration in pretreatment soil sampling for any constituent of concern indicates that the waste soil has constituent concentrations that are greater than 10 times but less than 100 times the constituent-specific maximum concentration of a contaminant for the UTS, *then* the treatment of the material represented by sampling of the treated waste or treatability samples will be determined when analysis of the treated waste demonstrates waste constituent concentrations of less than 10 times the UTS.

If the waste is found to exhibit the characteristic of ignitability, corrosivity, or reactivity in pretreatment soil sampling, *then* the treatment of the material represented by sampling of the treated waste or treatability samples will be determined when analysis of the treated waste demonstrates these hazardous waste characteristics have been eliminated.

If neither of the above cases are demonstrated by the treated waste or treatability studies sampling and analysis, *then* the treatment will not be considered successful and retreatment, alternate treatment, or alternate disposal of the soil will be required.

2.6 Decision Error Limits

Quantitative decision error limits will not be applied to the decisions discussed in Section 2.5, Decision Rule. Rather, the sampling approach (discussed below in Section 2.7, Design Optimization) for the two operations covered by this SAP, treatability studies and full-scale waste treatment, is graded based on the risk associated with each operation. In the case of the treatability studies, the risk of making an incorrect decision for a particular source of waste is limited due to the fact that when full-scale treatment operations for that same waste are implemented, confirmation sampling and analyses will also be performed on the treated waste to ensure that it meets the ICDF WAC for disposal in the landfill. For that reason, only a single sample will be analyzed for the treatability studies.

For full-scale treatment operations sampling, the risk of making an incorrect decision is significantly greater than for the treatability studies. For this reason, a significantly more intensive sampling program is presented to characterize the treated waste prior to disposal. Composite samples will be collected from the treated waste made up of subsamples from the individual treatment batches and an intensive sampling of treated waste in the early stages of processing will be utilized to confirm the waste stabilization process. The sampling approach is presented in Section 2.7, Design Optimization.

2.7 Design Optimization

2.7.1 Treatability Study Sampling

A representative grab sample will be collected and analyzed for UTS constituents and hazardous characteristics using standard EPA laboratory analytical methods. The decision process described in Section 2.5, Decision Rule, will be applied to the results of the treatability study samples.

2.7.2 Stabilized Waste Sampling

Sampling to confirm the treatment process for each source of waste will be conducted in the manner described in the remainder of this section.

The waste stabilization process, as currently envisioned, will involve the batch treatment of individual soil boxes or containers at the ICDF Complex. As treatment progresses for a series of waste batches, the treated batches will be combined into a larger container (expected to be a 10-yd^3 roll-on/roll-off container) for handling prior to disposal. Composite samples representing approximately 20 yd^3 or two containers, whichever is less, will be generated through the collection and compositing of

subsamples from each of the individual treatment batches that are combined into the larger containers. It is expected that five treatment batches will be combined into a larger container. However, the actual number of treatment batches may vary for each container.

The collection of representative composite samples from the containers will proceed in the following progression for the treatment campaign associated with each different source of waste:

1. For containers 1 through 10, five composite samples will be collected from containers 1-2, 3-4, 5-6, 7-8, and 9-10.

2. For containers 11 through 42, a composite sample will be collected from two randomly chosen containers out of every four containers (either the first two or the last two containers).

3. For containers 43 through completion of the treatment campaign, a composite sample will be collected from two consecutive containers randomly chosen from every 10 containers.

4. Finally, the two containers or 20 yd^3, whichever is less, from each treatment campaign will also composited into one sample.

In application of the decision rules presented in Section 2.5 Decision Rule, the sampling results from each composite sample collected from a container will be considered to be only representative of the container sampled and all unsampled containers generated following the last sampled containers. An example of this approach would be that the sampling results from containers x and x+1 would be considered representative of containers x and x+1 as well as containers not sampled between the previous sampling event and the sampling of container x. Should the sampling results from a container indicate that the treated soils in that container meet the alternative LDR treatment standards for contaminated soil (as described in Decision Rules 1 or 2, Section 2.5), then that container and all containers that sample represents would be considered to have met the alternative LDR standards. Should the sampling results from a container indicate that the treated wastes do not meet the treatment standards (Decision Rule 3, Section 2.5), then the waste in that container would be subject to retreatment, alternate treatment, or alternate disposal and the unsampled containers that the failed container represents would be resampled as though the sampling campaign were starting again with container number 1. Thus, should containers x and x+1 fail the treatment standard, the containers not sampled between the previous sampling event and the sampling of container x would each be sampled (and again subject to the decision rules). This would then be followed by randomly collecting a composite sample from two consecutive containers for every four containers for the next 32 containers similar to the sampling described in #2 above for containers 11-42. This would then be followed by the same sampling routine of collecting a random composite sample from two consecutive containers for every 10 containers for the remaining treatment campaign similar to #3 described above with the final two containers also being sampled. The frequency of waste sampling may be changed if deemed necessary due to unexpected changes in waste characterization. Alternate disposal may be at another facility or by approval as outlined in Section 2.2.1 of the ICDF Complex WAC (DOE-ID 2002c).

Finally, as each treatment campaign ends and waste soil from a new site or source is received at the ICDF Complex, a new waste treatment campaign will be considered to have started and the sampling progression described above will be restarted with the first container.

3. SAMPLING ACTIVITIES

The following sections describe the sampling procedures to be used to meet the DQOs described in Section 2. Prior to commencing any sampling activities, a prejob briefing will be held with all worksite personnel to review the requirements of the SAP and other work control documentation and to verify that all supporting documentation has been completed.

3.1 Sampling Procedures

The following is the sequence of events that will occur after the stabilization process has been initiated. Facility Operations personnel will stage the waste for sampling.

1. Following treatment of the waste or treatability study sample, the sample is obtained for analysis.

NOTE: In the full-scale treatment process by which each batch of waste material is stabilized, the treated waste is thoroughly mixed. Therefore, pulling the sample from the surface material is anticipated to be representative of the batch of treated waste overall.

2. For treatability study sampling, a simple grab sample is collected from the resulting treated waste.

3. For full-scale treatment sampling, a grab subsample is collected from each treatment batch that is to be combined in the larger containers, as described in Section 2.7.2, Stabilized Waste Sampling. Once all subsamples have been collected from the combined batches, the subsamples will be composited through thorough mixing in a stainless steel bowl using only stainless steel mixing tools.

4. The composite stabilized waste sample material or grab sample from treatability studies is placed into bottles that are labeled with the corresponding sample identification numbers using the sample identifiers in Section 4.1. Sample material will meet the size requirements for TCLP analysis per SW-846 Method 1311 (capable of passing through a 9.5-mm standard sieve).

5. Depending on the radiological activity, material must be shipped to the appropriate laboratory.

Stabilized waste samples will be shipped as soon as possible to the analytical laboratory accompanied by a chain of custody (COC) and appropriate shipping paperwork. The requester will coordinate the procurement of required packaging, if a cooler will not suffice for the levels of radioactivity anticipated (if activity exceeds that for limited quantity shipments). The laboratory will be contacted for notification of delivery. Upon receipt of the sample, the laboratory will check for damage to the sample container and check for discrepancies between the COC and the sample label information. The laboratory sample receiving person will then sign the COC indicating receipt and transfer of custody of the samples.

3.2 Decontamination Procedures

To prevent cross-contamination, the particle size reduction tools or any other sampling equipment that is not disposable and comes in contact with the sample must be cleaned as follows:

1. Wash and scrub equipment with a nonphosphate detergent deionized water solution

2. Rinse with deionized or tap water

3. Rinse with deionized water

4. Air dry all equipment

5. Ensure that a radiological control technician has surveyed and free-released equipment prior to removal

6. Wrap cleaned equipment in aluminum foil

7. Place custody seal on equipment.

3.3 Data Types

Samples will be analyzed to determine compliance with LDRs. This will include analysis of all applicable underlying hazardous constituents, volatile organic compounds (VOCs), semivolatile organic compounds (SVOC), and pH, as necessary. The analytes, methods, bottles, preservation types, and holding times for presently identified regulated constituents are provided in Table 3-1. This list will be modified as necessary as more waste characterization information is gathered.

Table 3-1. Stabilized waste.[a]

Analytes	Volume and Type	Method	Preservative	Holding Time
UHC metals	110 g minimum WMG[b]	SW-846 1311/3000/7000 and 6010B	Cool to 4°C	6 months; 28 days for mercury
VOCs	125 ml minimum WMG	SW-846 1311/8260B	Cool to 4°C	Analyze within 14 days
SVOCs (pyridine)	125 ml minimum WMG, amber	SW-846 8270C	Cool to 4°C	Analyze within 14 days
U134 (hydrogen fluoride)	250 ml minimum G or P	SW-846 9045C	Cool to 4°C	Analyze within 24 hours[c]

a. The information in this table will be confirmed using the laboratory contracts provided, including volume requirements needed to meet laboratory matrix spike/matrix spike duplicate requirements.

b. WMG = wide-mouth glass.

c. Holding time begins when the analysis is started.

3.4 Schedule

Upon receipt of the generator's Material Profile sheet and the determination that a treatability study is needed, the waste generator will supply a waste sample within 10 days. The samples will be stored in the treatment room. When the treatability study demonstrates that the waste can be successfully treated, the ICDF operations manager will approve the Material Profile and the full-scale waste treatment schedule will be set.

3.5 Discrepancies

In the event a discrepancy is discovered by field personnel or auditors, action will be initiated to correct the issue. The level of action taken is related to the level of the discrepancy. Discrepancy resolutions can range from field changes caused by unforeseen field conditions to DOE reportable incidents. Discrepancy resolutions will be documented and addressed in accordance with company policy.

4. SAMPLING CONTROL

Strict sample control is required on this project. Sample control ensures that unique sample identifiers are used for separate samples. It also ensures that documentation of sample collection information is such that a sampling event may be reconstructed at a later date. The following sections detail unique sample designation, sample handling (including shipping), and radiological screening of samples.

4.1 Sample Identification Code

A systematic 10-character identification (ID) code will be used to uniquely identify all samples. Uniqueness is required to prevent the same ID code from being assigned to more than one sample.

When the first three characters of the code are STF, this indicates that the sample originated from the Soils Treatment Facility. The next three numbers designate the sequential sample number for the project. The seventh and eighth characters represent a two-character set (e.g., 01, 02) for designation of field duplicate samples. The last two characters refer to a particular analysis and bottle type.

In this example, a stabilized soil sample collected in support of the ICDF Complex treatment operations might be designated as STF09001UT where (from left to right):

- STF designates the sample as being collected for posttreatment analysis
- 090 designates the sequential sample number
- 01 designates the type of sample (01 = original, 02 = field duplicate, 03 = field triplicate)
- UT designates analysis for UTS metals.

A SAP table/database will be used to record all pertinent information (well designation, media, date, etc.) associated with each sample ID code.

4.2 Sample Designation

4.2.1 Sample Analysis Plan Tables

A SAP table format was developed to simplify the presentation of the sampling scheme for project personnel. A blank copy of the SAP table is presented in Appendix A. As each batch of waste or treatability study sample is readied for shipment to the ICDF Complex, the analytical work and prepare waste-batch-specific SAP tables will be prepared.

4.2.2 Sample Description Fields

The sample description fields contain information related to individual sample characteristics.

4.2.2.1 Sampling Activity. The sampling activity field contains the first six characters of the assigned sample number. The sample number in its entirety will be used to link information from other sources (e.g., field data and analytical data) to the information in the SAP table for data reporting, sample tracking, and completeness reporting. The sample number will also be used by the analytical laboratory to track and report analytical results.

4.2.2.2 Sample Type. Data in this field will be selected from the following:

REG for a regular sample

QC for a quality control sample.

4.2.2.3 Media. Data in this field will be the following:

WASTE SOIL for waste soil collected from treatability studies or stabilization operations.

4.2.2.4 Collection Type. Data in this field will be selected from the following:

GRAB for grab samples from treatability studies

COMP for composite samples from stabilization operations

DUP for duplicate samples.

4.2.2.5 Planned Date. This datum, or event identifier, is related to the planned sample collection start date.

4.2.3 Sample Location Fields

The standard SAP tables utilize these fields to pinpoint the sample in three-dimensional space. For the purposes of this SAP, the use of these fields is modified to support identification of the type of sample being processed (treatability sample or stabilization sample), and the initial source of the waste being treated.

4.2.3.1 Area. The AREA field identifies the general sample-collection area. This field should contain the standard identifier for the INEEL area being sampled. For this sampling program, samples are being collected from the ICDF Complex; thus, the area identifier will be "ICDF Complex Soil Treatment Unit."

4.2.3.2 Location. The location field supplies additional descriptive information concerning the source of the waste undergoing either treatability studies or full-scale treatment at ICDF Complex. For example, for waste soil generated at the INTEC CERCLA Site CPP-99, the location would be identified as "CPP-99."

4.2.3.3 Type of Location. The field will indicate whether the sample is a treatability study sample using the term "TREAT" or if the sample was obtained from full-scale treatment sampling using the term "CONFIRM."

4.2.3.4 Depth. The DEPTH of a sample location is the distance in feet from surface level or a range in feet from the surface. This location field is not applicable to this sampling process and will not be utilized.

4.2.4 Analysis Types

These fields indicate analysis types (radiological, chemical, hydrological, etc.). Space is provided at the bottom of the form to clearly identify each type. A standard abbreviation should also be provided if possible.

4.3 Sample Handling

Analytical samples for laboratory analyses will be collected in precleaned containers and packaged according to American Society for Testing and Materials or EPA-recommended procedures. The quality assurance (QA) samples will be included to satisfy the quality assurance/quality control (QA/QC) requirements for the program as outlined in the Quality Assurance Project Plan (QAPjP) and in Section 4. Qualified analytical laboratories will analyze the samples.

4.3.1 Sample Preservation

Waste samples will be preserved as indicated in the analytical laboratory Scope of Work (SOW) and the *Quality Assurance Project Plan for Waste Area Group 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002d).

4.3.2 Chain-of-Custody Procedures

The COC procedures will be followed per the QAPjP (DOE-ID 2002d). Sample containers will be stored in a secured area accessible only to the field team members.

4.3.3 Transportation of Samples

Samples will be shipped in accordance with the regulations issued by the Department of Transportation (DOT) (49 CFR 171 through 49 CFR 178) as applicable and EPA sample handling, packaging, and shipping methods (40 CFR 262). Samples will be packaged in accordance with the requirements set forth in company policies.

4.3.3.1 Custody Seals. Custody seals will be placed on all shipping containers in such a way as to ensure that tampering or unauthorized opening does not compromise sample integrity. Clear plastic tape will be placed over the seals to ensure that the seals are not damaged during shipment.

4.3.3.2 On-Site and Off-Site Shipping. An on-Site shipment is any transfer of material within the perimeter of the INEEL. Site-specific requirements for transporting samples within INEEL boundaries and those required by the shipping and receiving department will be followed. Off-Site shipment will be coordinated with Packaging and Transportation personnel, as necessary, and will conform to all applicable DOT requirements.

4.4 Radiological Screening

Following sample collection, all sample containers will be smeared for external contamination. In addition, a hand-held radiation reading will be obtained to determine radiation levels at the surface of the sample containers. If radiation readings exceeding background are detected, an additional sample will be submitted to the INEEL analytical laboratory for a 20-min gamma analysis prior to shipment off-Site.

If it is determined that the contact readings on the samples exceed 200 mr/hr beta/gamma, the samples will be held for analysis in the INTEC Remote Analytical Laboratory.

5. QUALITY ASSURANCE/QUALITY CONTROL

The existing QAPjP developed for INEEL WAGs 1, 2, 3, 4, 5, 6, 7, 10, and the Inactive Sites Department will be used (DOE-ID 2002d). This plan pertains to all environmental, geotechnical, geophysical, and radiological testing, analysis, and data review. This section details the field elements of the QAPjP to support sampling operations.

5.1 Project Quality Objectives

The QA objectives specify the measurements that must be met to produce acceptable data for a project. The technical and statistical qualities of these measurements must be properly documented. Precision, accuracy, and completeness are quantitative parameters that must be specified for physical/chemical measurements. Comparability and representativeness are qualitative parameters.

The QA objectives for this project will be met through a combination of field and laboratory checks. Field checks will consist of collecting field duplicates. Laboratory checks consist of initial and continuing calibration samples, laboratory control samples, matrix spikes, and matrix spike duplicates. Laboratory QA is detailed in the QAPjP and is beyond the scope of this SAP.

5.1.1 Field Precision

Field precision is a measure of the variability not due to laboratory or analytical methods. The three types of field variability or heterogeneity are spatially within a data population, between individual samples, and within an individual sample. Although the heterogeneity between and within samples can be evaluated using duplicate and/or sample splits, overall field precision will be calculated as the relative percent difference between two measurements, or relative standard deviation between three or more measurements. The relative percent difference or relative standard deviation will be calculated as indicated in the QAPjP, for duplicate samples, during the data validation process. Precision goals have been established for inorganic Contract Laboratory Program (CLP) methods by the EPA (EPA 1993) and the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002d).

5.1.2 Field Accuracy

Cross-contamination of samples during collection or shipping could yield incorrect analytical results. To assess the occurrence of any cross-contamination events, field blanks will be collected to evaluate any potential impacts. One goal of the sampling program is to eliminate any cross-contamination associated with sample collection or shipping. Duplicate samples to assess precision will be co-located and collected by field personnel at a frequency of 1 in 20 (5%) of the samples.

5.1.3 Representativeness

Representativeness is evaluated by assessing the accuracy and precision of the sampling program and expressing the degree to which samples represent actual site conditions. In essence, representativeness is a qualitative parameter that addresses whether the sampling program was properly designed to meet the DQOs.

5.1.4 Comparability

Comparability is a qualitative measure of the confidence with which one data set can be compared to another. These data sets include data generated by different laboratories performing this work, data

generated by laboratories in previous studies, data generated by the same laboratory over a period of several years, or data obtained using different sampling techniques or analytical protocols. For field aspects of this program, data comparability will be achieved using standard methods of sample collection and handling.

5.1.5 Completeness

Field completeness will be assessed by comparing the number of samples collected to the number of samples planned. Field sampling completeness is affected by such factors as equipment and instrument malfunctions and insufficient sample recovery. Completeness can be assessed following data validation and reduction. The completeness goal for this project is 90% for all activities.

5.2 Field Data Reduction

The reduction of field data is important to ensure that there have been no errors in sample labeling and documentation. This includes cross-referencing the SAP table with sample labels, logbooks, and chain-of-custody forms. Prior to sample shipment to the laboratory, field personnel will ensure that all field information is properly documented.

5.3 Data Validation

Data will be validated to analytical method data validation A or B as described in the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites* (DOE-ID 2002d).

5.4 Quality Assurance Objectives for Measurement

The QA objectives are specifications that the monitoring and sampling measurements identified in the QAPjP must meet to produce acceptable data for the project. The technical and statistical quality of these measurements must be properly documented. Precision, accuracy, method detection limits, and completeness must be specified for chemical measurements. Specific QA objectives are included in *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10 and Inactive Sites* (DOE-ID 2002d).

6. DATA MANAGEMENT/DATA ANALYSIS AND UNUSUAL OCCURRENCES

Analytical data that result from sampling activities will be managed and maintained by the ICDF waste tracking system. This section discusses the approach to managing the data, analysis of data, and suggested responses to unusual occurrences.

6.1 Data Management

The following discussion presents the various processes associated with managing the data collected in as part of the Waste Stabilization Sampling Plan. Data management will follow guidelines specified in the following section.

6.1.1 Laboratory Analytical Data

Analytical data are managed and maintained in the Integrated Environmental Data Management System (IEDMS). The components that make up IEDMS provide an efficient and accurate means of sample and data tracking.

The IEDMS performs sample tracking throughout all phases of a sampling project, beginning with the assignment of unique sample identification numbers using the SAP application program. The SAP application program produces a SAP table, which contains a list of sample identification numbers, sample demographics (area, location, and depth), and the planned analyses. Once the SAP application database is finalized, it is used to automatically produce sample labels and tags (with or without barcode identification). In addition, sampling guidance forms can be produced for the field sampling team that provides information such as sampling location, requested analysis, container types, and preservative.

When the analytical data package, or Sample Delivery Group (SDG), is received, it is logged into the IEDMS journaling system, an integrated subsystem of the sample tracking system, which tracks the SDG from data receipt to Environmental Restoration Information System (ERIS). Cursory technical reviews on the data packages are performed to assess the completeness and technical compliance. This information is sent to the validator with the data package (when required).

Errors in the data package are resolved among the INEEL chemist(s), the originating lab, and the IEDMS staff. Data validity is assured by the validator through the assignment of data validation flags. The validator generates a limitations and validation (L&V) report, which gives detailed information on the assignment of data qualifier flags. A copy of the form 1's accompanies the L&V report with the validator-assigned data qualifier flags and any changes to the data result. The validated data results, along with the data qualifier flags, are entered into the IEDMS database. From this database, a summary table (result table) is generated. The result table summarizes the sample identification numbers, sample logistics, analytes, and results for each particular type of analysis (such as inorganic, radiological, organic) from the sampling effort. The field sample data from this database are also uploaded to ERIS.

6.1.2 Field Data

Field data include all data that are nonchemical analytical data generated in support of the ICDF Complex sampling program, for example, pH, temperature, sample location. This data will be managed according to the requirements specified in *Data Management Plan for the Idaho National Engineering and Environmental Laboratory Environmental Restoration Program* (INEL 1995).

6.2 Data Analysis

6.2.1 Laboratory Analytical Data

Analytical data will be validated and analyzed.

6.2.2 Field Data

Field data will be analyzed using methods that are appropriate for the data types and specific field conditions. The analysis will include recognized methods and techniques that are used with the specific data types and may include statistical processes.

6.3 Unusual Occurrences

Unusual occurrences are situations that are unforeseen, unanticipated, or unexpected. They may occur in chemical data sets or as field-related data and observations. An example of an unusual occurrence is detection of a contaminant of concern where previously it was undetected.

The following is meant to provide a process for resolving an unusual occurrence rather than a method for dealing with each specific unusual occurrence. The following steps will be taken to resolve an unusual occurrence:

- Record the unusual occurrence and supporting observations in the field logbook
- Validate unusual occurrence (e.g., reanalyze the sample if any remaining) and report to program manager as soon as possible
- Determine if the occurrence is a one-time event or is recurring
- If the unusual occurrence is not of a significant nature (e.g., malfunctioning instrument that is reporting increases in water levels), it will be resolved by the technical leader and is a nonissue.

7. PROJECT ORGANIZATION AND RESPONSIBILITIES

The ICDF Complex management is responsible for ensuring that the SSSTF operations and maintenance activities are performed in accordance with the O&M plan (DOE-ID 2003a). Section 2 of this plan provides the detailed organizational roles and responsibilities.

8. WASTE MANAGEMENT

Remediation-derived waste generated during the sampling may include the following:

- Contaminated personal protective equipment, wipes, bags, and other refuse
- Contaminated sampling equipment
- Used sample containers and disposable sampling equipment
- Aqueous and liquid organic analytical wastes.

The disposition and handling of waste will be consistent with the ICDF Complex Operations WMP (DOE-ID 2003d).

9. HEALTH AND SAFETY

Work performed for the posttreatment soils stabilization sampling will be in accordance with the *Health and Safety Plan for INEEL CERCLA Disposal Facility Operations* (INEEL 2003).

10. DOCUMENT MANAGEMENT

Subsection 10.1 summarizes document management and sample control. Documentation includes field logbooks used to record field data and sampling procedures, chain-of-custody forms, and sample container labels. The analytical results from this field investigation will be documented in reports.

10.1 Documentation

The QA/QC officer will be responsible for controlling and maintaining all field documents and records and for verifying that all required documents to be submitted to the INEEL are maintained in good condition. All entries will be made in indelible black ink. Errors will be corrected by drawing a single line through the error and entering the correct information. All corrections will be initialed and dated.

10.1.1 Sample Container Labels

Waterproof, gummed labels generated from the SAP database will display information such as the unique sample identification number, the name of the project, sample location, and analysis type. Labels will be completed and placed on the containers in the field before collecting the sample. Sample team members will provide information necessary for label completion. Such information may include sample date, time, preservative used, field measurements of hazards, and the sampler's initials.

10.1.2 Field Guidance Form

Field guidance forms, provided for each sample location, will be generated from the SAP database, to ensure unique sample numbers. These forms are used to facilitate sample container documentation and organization of field activities and contain information regarding the following:

- Media
- Sample ID numbers
- Sample location
- Aliquot ID
- Analysis type
- Container size and type
- Sample preservation.

10.1.3 Field Logbooks

In accordance with INEEL format, field logbooks will be used to record information necessary to interpret the analytical data.

10.1.3.1 Sample/Shipping Logbook. The field teams will use sample logbooks. Each sample logbook will contain information such as:

- Physical measurements (if applicable)

- All quality control (QC) samples
- Shipping information (e.g., collection dates, shipping dates, cooler ID number, destination, chain-of-custody number, name of shipper)
- All team activities
- Problems encountered
- Visitor log
- List of site contacts.

This logbook will be signed and dated at the end of each day's sampling activities.

10.1.3.2 Field Instruments Calibration/Standardization Logbook. A logbook containing records-of-calibration data will be maintained for each piece of equipment requiring periodic calibration or standardization. This logbook will contain log sheets to record the date, time, method of calibration, and instrument ID number.

10.1.3.3 Field Supervisor's Daily Logbook. A project logbook maintained by the field supervisor will contain a daily summary of the following:

- All field team activities
- Visitor log
- List of site contacts
- Problems encountered
- Any corrective actions taken as a result of field audits.

This logbook will be signed and dated at the end of each day's sampling activities.

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Appendix A

Sampling Analysis Plan Table for Chemical Analysis

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Page of

Plan Table Number:

SAP Number:

Date: / / Plan Table Revision: Project: Project Manager: SMO Contact:

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Location	Type of Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20

The sampling activity displayed on this table represents the first six characters of the sample identification number. The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: _____
AT2: _____
AT3: _____
AT4: _____
AT5: _____
AT6: _____
AT7: _____
AT8: _____
AT9: _____
AT10: _____

AT11: _____
AT12: _____
AT13: _____
AT14: _____
AT15: _____
AT16: _____
AT17: _____
AT18: _____
AT19: _____
AT20: _____

Comments:

Analysis Suites:

Contingencies: